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AUTHOR Haggstrom, Gus W.; Morrison, Peter A.
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ABSTRACT

Adolescent parenthood was investigated based on a large panel study known as the National Longitudinal Study of the High School Class of 1972 (NLS) which has tracked over 22,000 adolescents who are now in their early 20's and have experienced many of the near-term consequences of early parenthood. Procedures for creating variables that mark entry into marriage and commencement of parenthood for the NLS respondents were conducted to rectify serious deficiencies in the NLS date base. A descriptive profile of four categories of respondents, i.e., late-adolescent parents, early-adult parents, adult parents, and nonparents, provides descriptive comparisons among parents and nonparents, as well as certain benchmark comparisons for validation purposes. Additionally, a statistical model for gauging the consequences of early parenthood addresses certain methodological issues in assessing consequences from data sets that contain data for both parents and nonparents. (Author)

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INVESTIGATING ADOLESCENT PARENTHOOD WITH THE NATIONAL LONGITUDINAL STUDY OF HIGH SCHOOL SENIORS

Gus W. Haggstrom and Peter A. Morrison

February 1979

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The Rand Corporation
Santa Monica, California 90406

SUMMARY

This paper is an interim report on a study of adolescent parenthood. The research is based on a large panel study known as the National Longitudinal Study of the High School Class of 1972 (NLS), which has tracked over 22,000 adolescents who are now in their early twenties and have experienced many of the near-term consequences of early parenthood.

Three areas of endeavor are treated. First, we describe our procedures for creating variables that mark entry into marriage and commencement of parenthood for the NLS respondents, thereby rectifying serious deficiencies in the NLS data base. Our technical discussion of these procedures is intended primarily for other researchers who may want to adopt our procedures in working with the same data set. Second, we provide a descriptive profile of four categories of respondents: late-adolescent parents, early-adult parents, adult parents, and nonparents. This profile affords interesting descriptive comparisons among parents and nonparents, as well as certain benchmark comparisons for validation purposes. Third, we develop a statistical model for gauging the consequences of early parenthood. This model addresses certain methodological issues in assessing consequences from data sets that contain data for both parents and nonparents.

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INVESTIGATING ADOLESCENT PARENTHOOD WITH THE NATIONAL LONGITUDINAL STUDY OF HIGH SCHOOL SENIORS*

by

Gus W. Haggstrom and Peter A. Morrison
The Rand Corporation, Santa Monica, Calif. 90406

I. INTRODUCTION AND OVERVIEW

The Rand Corporation, under contract to NICHD, is studying the consequences of adolescent parenthood in five major areas of adolescent parents' lives: (1) personality (self-esteem, locus of control, and adult role orientations), (2) future expectations and aspirations concerning education, career choice, and family growth, (3) women's perceptions and orientations about homemaking and work, (4) young parents' economic well-being, and (5) economic dependency on parents and society. Our research is based on the National Longitudinal Study of the High School Class of 1972 (hereafter, NLS), a large panel study of about 22,000 adolescents who are now in their early twenties and have experienced many of the near-term consequences of early parenthood.**

This paper, an interim report on work in progress, focuses on procedures we have developed for using the NLS to investigate adolescent parenthood. As such, it should interest others who are conducting

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**The NLS data have been collected as part of a large-scale longitudinal survey effort by the National Center for Educational Statistics, designed to provide information on high school students as they move into early adulthood. The NLS was originally motivated by a need for data to analyze critical issues in educational policy, but it has taken on much broader significance as a data base that can support policy analysis on a variety of issues.

secondary analyses of longitudinal data sets which, like the NLS, are plagued by imperfectly measured demographic concepts and by missing or inconsistent values on such key variables as parenthood and marital status. Three areas of endeavor are described here.

First, we have rectified serious deficiencies in those items on the NLS that mark entry into marriage and commencement of parenthood. Our technical discussion of these remedies in Sec. II is intended primarily for other researchers using the NLS data base who may want to adopt our procedures.

Second, we have constructed a descriptive profile of four types of respondents identifiable in the NLS file: late-adolescent parents, early-adult parents, adult parents, and nonparents. This profile, presented in Sec. III, affords interesting descriptive comparisons among parents and nonparents and certain benchmark comparisons for validation purposes.

Third, we have developed a statistical model for gauging parenthood consequences. This model, described in Sec. IV, should be of particular interest to other NICHD contractors because it addresses certain methodological issues in assessing consequences with micro data sets which, like ours, contain parents and nonparents. As an illustration of our approach, we describe an initial analysis of how parenthood in late adolescence impinges on educational expectations, self-esteem, and locus of control.

II. REFINING PARENTHOOD AND MARITAL STATUS VARIABLES ON THE NLS

Adolescent parenthood is a special case of the more general process whereby families form and expand. A critically important dimension of this process is its timing, i.e., exactly *when* parenthood commences, and in conjunction with what other life-cycle events.* For our research, we needed to estimate two variables that mark this process: (1) when the NLS respondents first became parents, and (2) when changes in marital status occurred. As will be seen below, the NLS data base does not lend itself well to making precise determinations of these changes. The information on parenthood and marital status is both ambiguous and inconsistent, and important items often are missing. These deficiencies, if not remedied, would introduce systematic biases into any analysis.

The NLS data tape provides a voluminous file of information on 22,652 young women and men who were surveyed initially as high school seniors in the spring of 1972. After this base-year survey, three follow-up surveys were administered in the fall of 1973, 1974, and 1976. Although the response rates for each survey were high, only 62 percent of the subjects responded to all four surveys (see Fig. 1).** Moreover, the missing-values problem was compounded by a tendency for some individuals to respond to only a few items on what are very lengthy questionnaires.***

Information on parenthood and marital status was collected on each of the three follow-up surveys but not on the base-year survey. These

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*Larry L. Bumpass and Edward K. Mburugu, "Age at Marriage and Completed Family Size," *Social Biology*, Vol. 24, No. 1, Spring 1977, pp. 31-37.

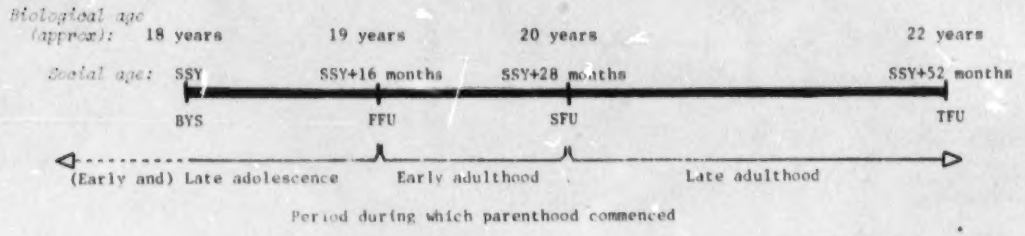
**Response rates are over 90 percent, although they vary for different waves. For a detailed technical description of the NLS sample, see Stephen J. Carroll and Peter A. Morrison, *National Longitudinal Study of High School Seniors: An Agenda for Policy Research*, The Rand Corporation, R-1964-HEW, June 1976, App. A.

***For documentation of the NLS data tape, see Jay R. Levinsohn, et al., *National Longitudinal Study: Base Year, First, Second, and Third Follow-up Data File Users Manual*, 2 vols., Research Triangle Institute, Chapel Hill, North Carolina, April 1978.

	FREQUENCY OF APPEARANCE		
	N	%	CUM.%
NO WAVE MISSING			
	14,112	62.3	62.3
ONE WAVE MISSING			
	4,903	21.6	83.9
	478	2.1	86.0
	231	1.0	87.0
	788	3.5	90.5
TWO WAVES MISSING			
	118	0.5	91.0
	112	0.5	91.5
	391	1.7	93.2
	18	0.1	93.3
	66	0.3	93.6
	504	2.2	95.8
THREE WAVES MISSING			
	486	2.1	97.9
	309	1.4	99.3
	16	0.1	99.4
	120	0.5	99.9
TOTALS:	22,652	100%	100%

Fig. 1--Patterns of missing waves on NLS

data furnish a chronology of adolescent parenthood that can be diagrammed as follows:


Biological age (approx): 18 years 19 years 20 years 22 years
Social age: SSY SSY+16 months SSY+28 months SSY+52 months
BYS FFU SFU TFU
(Early and) Late adolescence
Early adulthood
Late adulthood
Period during which parenthood commenced

The abbreviations in the diagram above are defined as follows:

BYS: Base-year survey, corresponding to the spring of the senior year (SSY) in high school and approximately 18 years of age.

FFU: The first follow-up (approximate age 19), on which *married* respondents were asked how many children they had.*

SFU: Second follow-up (approximate age 20), on which *all* respondents were asked how many children they had.

TFU: Third follow-up (approximate age 22), on which *all* respondents were asked how many children they had.

By responding completely and consistently on only the three follow-up surveys, then, a person would disclose how many children he or she had at each of three points in time.** Claiming at least one child would qualify a respondent as having entered into the parenthood *role* in a

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*The primary source of information on parenthood consisted of questions asking *how many* children the respondent had as of the first week of October 1973, 1974, and 1976. In 1973 only, respondents also were queried as to *whether or not* they had any children as of October 1973.

**From Fig. 1, the reader can calculate that a total of 83.9 percent of the sample responded to all three of the follow-up surveys. Most of these respondents, of course, failed to complete some items on the surveys.

sociological sense; whether the respondent was the biological parent, however, cannot be determined at any time point. The two certainly should not be regarded as equivalent. For example, childbearing does not turn into parenthood if the child is put up for adoption, nor does parenthood imply childbearing where the child has been adopted. Conversely, claiming no children does not rule out the possibility that the respondent once bore a child but relinquished it for adoption.

Information on when respondents became married also was elicited on each of the three follow-up surveys, which inquired about marital status and the date of marriage.* Once again, actual responses frequently are inconsistent or missing.

Not surprisingly, much of our effort has centered on determining respondents' parenthood and marital status at the FFU, SFU, and TFU time points on the basis of frequently inconsistent and incomplete data. The procedures we have devised enable us to maximize the use of the information that is available without exceeding its limits.** Briefly, we have created seven key variables that summarize the NLS information on parenthood and marital status:

NCHILD73, NCHILD74, NCHILD76: Number of children as of the first week of October in 1973, 1974, and 1976.

MARDATE: A composite estimate of the date of first marriage, based on responses to questions about marriage date and marital status on each of the three follow-up surveys.

MAR73, MAR74, MAR76: Marital status as of the first week of October in 1973, 1974, and 1976.

These created variables embody important technical refinements that reduce missing values and resolve inconsistencies among responses. The improvements resulting from these technical refinements are

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*Reference was to *first* marriage on the first and second follow-ups, but not on the third follow-up.

**These procedures are documented in Thomas J. Blaschke, Gus W. Haggstrom, and Peter A. Morrison, "Procedures for Estimating Parenthood and Marital Status for Respondents to the National Longitudinal Study of the High School Class of 1972," unpublished paper, January 1979.

indicated in Tables 1 through 7, which compare each of our created variables with the corresponding NLS items. Each table shows frequencies of missing values on both original items and created variables, and hence the extent to which missing values have been reduced. (These data do not register the occasional instances where inconsistencies over time have been resolved.)

The logic of our procedures is reflected in the pattern of changes in these tables. Most noticeable are the reductions in the number of unknown or missing responses in going from the original item to the created variable. The largest reductions are for the first follow-up created variables (MAR73 and NCHILD73). Lesser reductions are seen in later follow-ups, reflecting the diminished subsequent information from which to estimate missing values. In some cases, differences between the original items and created variables reflect corrections of inconsistent responses over the three follow-ups (e.g., making the marital status variables consistent with the composite marriage date).

A close examination of Tables 1-3 reveals that the estimated values of the marital status variables follow approximately the same pattern as the known responses. For example, among the persons who responded to the marital status question FQ7A on the first follow-up, 82 percent were single. (See Table 1.) Of the 2997 persons whose marital status was missing on FQ7A and whose marital status was estimated using MAR73, 84 percent were categorized as single.

For the parenthood questions, the problem of missing responses was complicated by the fact that the single respondents were routed around questions FQ8A and FQ8B. For single parents, then, the number of children at the first follow-up usually was not known. However, a number of single respondents violated the routing instructions and responded to questions FQ8A and FQ8B anyway, thus positively identifying themselves as parents and providing known values of NCHILD73. Responses from this highly censored group are of questionable validity, and we intend to exclude them from most phases of our analysis.

It will be noted from Table 4 that most of the unknown responses to FQ8B were changed to "none" in creating NCHILD73. This resulted

Table 1

FREQUENCY COUNTS FOR MAR73 (MARITAL STATUS IN OCTOBER 1973) WITH COMPARABLE COUNTS FOR RESPONSES TO FQ7A

	MAR73		FQ7A[a]	
Marital Status	Code	Frequency	Code	Frequency
Single	1	18,045	1,2,21,22	15,528
Currently married	2	3,730	3,43	3,290
Currently separated, divorced, or widowed	3	121	4,44	129
Ever married, current status unknown	4	48	--	--
Unknown	99	708	All others	3,705
Total		22,652		22,652

[a]FQ7A is the marital status item on the First Follow-up Questionnaire. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 2

FREQUENCY COUNTS FOR MAR74 (MARITAL STATUS IN OCTOBER 1974) WITH COMPARABLE COUNTS FOR RESPONSES TO SQ105

	MAR74		SQ105[a]	
Marital Status	Code	Frequency	Code	Frequency
Single	1	15,200	1,2,21,22	14,226
Currently married	2	5,421	4,44	4,942
Currently separated, divorced, or widowed	3	342	3,23	360
Ever married, current status unknown	4	258	--	--
Unknown	99	1,431	All others	3,124
Total		22,652		22,652

[a]SQ105 is the marital status item on the Second Follow-up Questionnaire. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 3

FREQUENCY COUNTS FOR MAR76 (MARITAL STATUS IN OCTOBER 1976) WITH COMPARABLE COUNTS FOR RESPONSES TO TQ129

	MAR76		TQ129[a]	
Marital Status	Code	Frequency	Code	Frequency
Single	1	10,864	1,2,21,22	10,896
Currently married	2	8,196	4,44	8,190
Currently separated, divorced, or widowed	3	912	3,23	903
Ever married, current status unknown	4	417	--	--
Unknown	99	2,263	All others	2,663
Total		22,652		22,652

[a]TQ129 is the marital status item on the Third Follow-up Questionnaire. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 4

FREQUENCY COUNTS FOR NCHILD73 (NUMBER OF CHILDREN IN OCTOBER 1973) WITH COMPARABLE COUNTS FOR RESPONSES TO FQ8B

	NCHILD73		FQ8B[a]	
Number of Children	Code	Frequency	Code	Frequency
None	0	20,559	0,100,200	16
One	1	1,140	1,101,201	917
Two	2	90	2,102,202	93
Three	3	16	3	7
Four or more	4	2	4	1
Missing	99	845	All others	21,618
Total		22,652		22,652

[a]FQ8B is the number-of-children item on the First Follow-up Questionnaire. Single respondents were routed around this question, but some chose to answer it anyway. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 5

FREQUENCY COUNTS FOR NCHILD74 (NUMBER OF CHILDREN IN OCTOBER 1974) WITH COMPARABLE COUNTS FOR RESPONSES TO SQ118

	NCHILD74		SQ118[a]	
Number of Children	Code	Frequency	Code	Frequency
None	0	18,915	0	16,744
One	1	2,316	1	2,103
Two	2	321	2	296
Three	3	21	3	25
Four	4	8	4	8
Five or more	5	2	5	7
Missing	99	1,069	All others	3,469
Total		22,652		22,652

[a]SQ118 is the number-of-children item on the Second Follow-up Questionnaire. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 6

FREQUENCY COUNTS FOR NCHILD76 (NUMBER OF CHILDREN IN OCTOBER 1976) WITH COMPARABLE COUNTS FOR RESPONSES TO TQ138B

	NCHILD76		TQ138B[a]	
Number of Children	Code	Frequency	Code	Frequency
None	0	15,241	0	14,862
One	1	3,588	1	3,560
Two	2	1,053	2	1,043
Three	3	128	3	132
Four	4	19	4	21
Five	5	3	5	4
Six or more	6	2	6	8
Missing	99	2,618	All others	3,022
Total		22,652		22,652

[a]TQ138B is the number-of-children item on the Third Follow-up Questionnaire. For definitions of the codes, see Levinsohn et al., Vol. 2.

Table 7

FREQUENCY COUNTS FOR MARDATE (YEAR OF MARRIAGE) WITH COMPARABLE COUNTS FROM THREE FOLLOW-UP SURVEYS

	MARDATE (yr)		FQ7C[a]		SQ106B[a]		TQ130B[a]	
Year of Marriage	Code	Frequency	Code	Frequency	Code	Frequency	Code	Frequency
Before 1965	--	--	--	--	--	--	62,64	2
1965	65	1	--	--	--	--	65	1
1966	66	--	--	--	--	--	--	--
1967	67	2	67	1	67	1	67	2
1968	68	3	68	2	68	2	68	3
1969	69	11	69	9	69	8	69	7
1970	70	67	70,170	57	70,170	46	70	54
1971	71	245	71	213	71,171	188	71	200
1972	72	1,731	72,172	1,449	72,172	1,369	72,172	1,472
1973	73	2,198	73,173	1,579	73,173	1,791	73,173	1,918
1974	74	2,034	74,174	26	74,174	1,596	74,174	1,978
1975	75	1,629	--	--	75,175	10	75,175	1,728
1976	76	1,435	--	--	--	--	76,176	1,578
Legitimate skip[b]	98	10,841						
Missing	99	2,455	All others	19,316	All others	17,641	All others	13,709
Total		22,652		22,652		22,652		22,652

[a]FQ7C, SQ106B, and TQ130B are the items on year of marriage on the three follow-up surveys. For definitions of the codes, see Levinsohn et al., Vol. 2.

[b]This category is for respondents who were still single (never married) as of October 1976.

primarily from our basic premise for estimating missing values, namely, that NCHILD73 $\leq$ NCHILD74 $\leq$ NCHILD76 unless the actual responses indicated otherwise. This led us to replace missing values for FQ8B by "none" whenever NCHILD74 was known to be zero.

In creating NCHILD74, we reduced the number of missing responses to SQ118 from 3469 to 1069. (See Table 5.) Again, the estimated values tend to follow the same pattern as the known responses. The remaining tables furnish comparable information on the other created variables.

III. DESCRIPTIVE PROFILE OF PARENTS AND NONPARENTS

Applying the procedures outlined in Sec. II, we have identified 4858 respondents who were parents by October 1976, some 52 months out of high school (Table 8). These parents, of whom 3008 are females and 1850 males, are classified into three groups according to when they initially entered the parenthood role:*

1. *Late-adolescent parents* (N = 1248): Respondents (most of them ever-married) who were parents by the first follow-up, i.e., 16 months after the end of high school, a point at which most had recently turned 19.

2. *Early-adult parents* (N = 1331): Respondents (regardless of marital status) who commenced parenthood between the first and second follow-ups, i.e., between the 16th and 28th month after high school, or roughly between 19 and 20 years of age.

3. *Adult parents* (N = 2279): Respondents (regardless of marital status) who commenced parenthood between the second and third follow-ups, i.e., between the 28th and 76th month after high school, or roughly between 20 and 22 years of age.

Respondents who had not become parents by the third follow-up are classified as "never a parent" and those whose parenthood status cannot be ascertained are classified as "unknown."

The racial composition of parents and nonparents (Table 9) confirms what is already well known: that adolescent and early-adult parents are disproportionately Blacks. Another expected relationship is

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*Several features of the NLS data base guided our conceptualization here. First, the data measured entry into the parenthood *role* (not always equivalent to childbearing). This is a significant consideration since, as noted earlier, childbearing does not automatically turn into parenthood. Second, we rely on a social, rather than a strictly biological, definition of age in which the senior year of high school serves as the reference point. While biological age is the usual proxy for progress through the graded social roles that comprise the transition to adulthood, our focus here on social age enables us to interpret parenthood more directly within a sociological framework.

Table 8

NUMBER OF PARENTS IDENTIFIED IN NLS SAMPLE

Stage During Which Parenthood Commenced[a]						
Late Adolescence	Early Adulthood	Adulthood	Total, All Stages	Never a Parent	Parenthood Status Unknown	Total[b]
Females						
887	836	1285	3008	7182	1146	11,336
7.8%	*7.1%*	*11.3%*	*26.5%*	*63.4%*	*10.1%*	*100%*
Males						
351	495	994	1850	7876	1441	11,167
3.2%	*4.4%*	*8.9%*	*16.6%*	*70.5%*	*12.9%*	*100%*

SOURCE: NLS data base (1/3/79: 4).
NOTE: Data are preliminary and subject to revision.

[a] Late adolescence = no later than 16 months after end of high school (approximately 19 years of age or younger); early adulthood = 16 to 28 months after high school (approximately 19 to 20 years of age); adulthood = 28 to 76 months after high school (approximately 20 to 22 years of age).

[b] Excludes 149 cases of unknown gender.

Table 9

RACIAL COMPOSITION OF PARENTS AND NONPARENTS

Race	Stage During Which Parenthood Commenced[a]			Never a Parent	Parenthood Status Unknown	Total	
	Late Adolescence	Early Adulthood	Adulthood			%	N
Females							
White	58.2	57.7	72.5	80.6	68.3	75.0	8,505
Black	33.5	29.9	17.7	11.3	14.4	15.4	1,749
Mex-Amer	3.6	5.0	4.5	2.5	3.7	3.1	352
Other[c]	4.7	7.4	5.3	5.6	13.6	6.4	730
Total	100%	100%	100%	100%	100%	100%	11,336
Males							
White	58.7	57.6	68.9	82.2	68.8	77.5	8,650
Black	25.5	32.7	19.9	8.8	15.8	12.3	1,369
Mex-Amer	7.5	3.8	4.7	2.7	3.5	3.2	354
Other[c]	8.3	5.9	6.4	6.3	11.9	7.1	794
Total	100%	100%	100%	100%	100%	100%	11,167

SOURCE: NLS data base (1/3/79: 8-9).
NOTE: Data are preliminary and subject to revision.

[a] Late adolescence = no later than 16 months after end of high school (approximately 19 years of age or younger); early adulthood = 16 to 28 months after high school (approximately 19 to 20 years of age); adulthood = 28 to 76 months after high school (approximately 20 to 22 years of age).

[b] Excludes 149 cases of unknown gender.

[c] "Other" combines American Indian, Puerto Rican, Latin American, Asian American, Other, and unclassified.

seen in the data on socioeconomic composition (Table 10): Adolescent and early-adult parenthood tends to be concentrated among low socioeconomic status youth and is comparatively rare among high-SES youth. Thus, the sample of parents identified by our procedures shows no obvious signs of bias in terms of either racial or socioeconomic composition.

The number of children that respondents have at each of the several survey follow-ups affords another point of view for validation. In Table 11, we compare the NLS females with the comparable female birth cohort (1954) at ages that correspond with the first, second, and third NLS follow-ups. At the first follow-up, for example, 92 percent of NLS respondents had no children, 7 percent had one child, and so forth. Corresponding data for the 1954 birth cohort in Table 11 indicate that a substantially higher fraction of 19-year-old females had children. This discrepancy is attributable to the fact that the NLS sample includes only those adolescents who were still in high school in the spring of their senior year, thereby excluding all high school dropouts--many of them undoubtedly early-adolescent parents. With advancing age, the two distributions change, of course, but the NLS and cohort data parallel each other.

Briefly, then, our procedures for identifying parents yield plausible results. The parent groups appear representative in terms of their racial and socioeconomic composition and trends in family size.

Table 12 provides additional data on marital status, and Fig. 2 indicates the timing of marriage. All of our procedures described in Sec. II have been aimed at estimating the first-marriage date, but it is possible that in a very small fraction of cases, the dates assigned refer to subsequent marriages.

The data on marital status (Table 12) show that for the entire sample, the percentage of females ever married rose from 24 as of the first follow-up to 54 by the third follow-up. For males, the corresponding rise is from 11 to 39 percent. A rough check on the validity of these figures is possible with comparable data from the Current Population Survey showing the proportions of persons 18-19 years old

Table 10

SOCIOECONOMIC COMPOSITION OF PARENTS AND NONPARENTS

Socio-economic Status	Stage During Which Parenthood Commenced: Late Adolescence	Early Adulthood	Adulthood	Never a Parent	Parenthood Status Unknown	Total[b] %	Total[b] N
Females							
High	6.4	8.5	9.9	26.8	16.2	20.9	2,365
Medium	40.2	40.2	47.9	49.2	47.2	47.5	5,380
Low	52.9	50.1	41.6	23.4	31.1	30.5	3,460
Unclass.	0.5	1.2	0.6	0.6	5.5	1.2	131
Total	100%	100%	100%	100%	100%	100%	11,336
Males							
High	7.8	8.3	11.6	28.7	19.0	24.4	2,720
Medium	46.8	41.8	47.9	48.3	42.5	47.2	5,272
Low	45.2	48.9	39.3	22.0	31.9	26.8	2,988
Unclass.	0.3	1.0	1.3	0.9	6.6	1.7	187
Total	100%	100%	100%	100%	100%	100%	11,167

SOURCE: NLS data base (1/3/79: 10-11).

NOTE: Data are preliminary and subject to revision.

Late adolescence = no later than 16 months after end of high school (approximately 19 years of age or younger); early adulthood = 16 to 28 months after high school (approximately 19 to 20 years of age); adulthood = 28 to 76 months after high school (approximately 20 to 22 years of age).

[a] Excludes 149 cases of unknown gender.

[b] The NLS socioeconomic status index is a composite of father's education, mother's education, father's occupation, family income, and a measure of certain items present in the household.

Table 11

DISTRIBUTION OF NLS FEMALES BY NUMBER OF CHILDREN AT EACH FOLLOW-UP, WITH COMPARABLE DATA FOR 1954 BIRTH COHORT

(percentages)

No. of children	NLS females[a] at: First follow-up (age ≅ 19)	Second follow-up (age ≅ 20)	Third follow-up (age ≅ 22)	1954 female cohort at: Age 19 (1973)	Age 20 (1974)	Age 22 (1976)
0	91.9	83.7	71.1	82.5	75.7	63.5
1	7.4	14.2	21.8	14.1	18.5	23.5
2	0.6	2.0	6.3	2.9	4.8	10.2
≥3	0.1	0.2	0.9	0.5	1.0	2.8
Total	100%	100%	100%	100%	100%	100%

SOURCES: NLS data base (12/21/78: 5, 11, 13); Robert L. Heuser, *Fertility Tables for Birth Cohorts by Color: United States, 1917-73*. DHEW Publication No. (HRA)76-1152, Washington, U.S. Government Printing Office, April 1976, Table 8A, updated with unpublished statistics from National Center for Health Statistics.

[a] Excludes respondents for whom number of children is unknown.

Table 12

PERCENTAGE OF PARENTS AND NONPARENTS WHO HAVE EVER MARRIED AS OF EACH FOLLOW-UP SURVEY

Reference Point	Stage During Which Parenthood Commenced[a]			Never a Parent	Parenthood Status Unknown	Total Ever Married[b]	
	Late Adolescence	Early Adulthood	Adulthood			%	N
Females							
First follow-up (age ≅ 19)	76.8[c]	59.8	38.4	10.9	25.3	24.2	2665
Second follow-up (age ≅ 20)	82.4	75.2	65.4	19.5	(d)	36.0	3857
Third follow-up (age ≅ 22)	87.2	82.0	86.7	39.4	(d)	54.2	5628
Males							
First follow-up (age ≅ 19)	87.5	48.9	20.6	3.9	12.1	11.1	1195
Second follow-up (age ≅ 20)	91.1	73.8	50.5	9.3	(d)	20.4	2113
Third follow-up (age ≅ 22)	93.3	83.0	86.4	26.1	(d)	38.8	3822

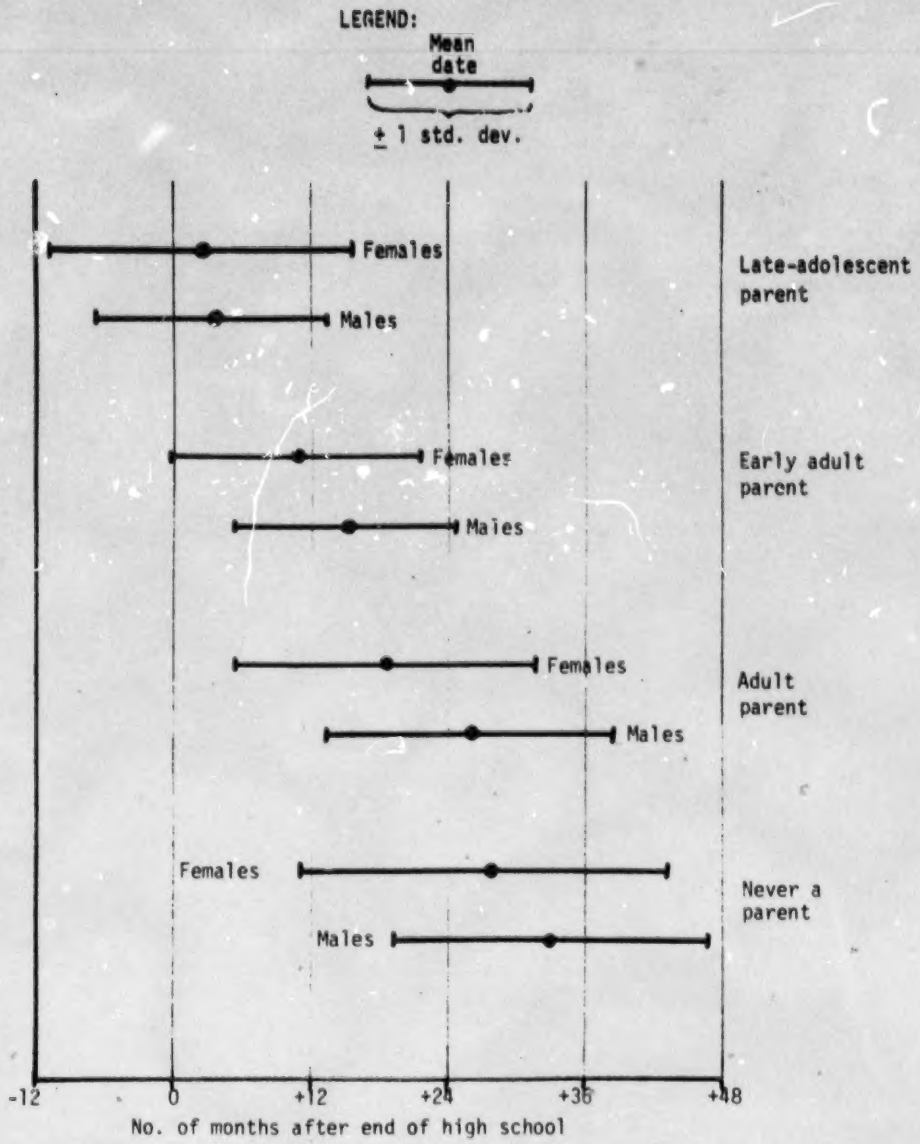
SOURCE: NLS data base (1/3/79: 12-17).
NOTE: Data are preliminary and subject to revision.

[a] Late adolescence = no later than 16 months after end of high school (approximately 19 years of age or younger); early adulthood = 16 to 28 months after high school (approximately 19 to 20 years of age); adulthood = 28 to 76 months after high school (approximately 20 to 22 years of age).

[b] Excludes 149 cases of unknown gender.

[c] The percentage of late-adolescent parents married as of the first follow-up reflects the effect of the routing pattern on the first follow-up questionnaire, which systematically excluded most single parents from the base.

[d] Percentages for each reference point are based on respondents whose marital status at that point is known. Percentages are not shown where marital status is unknown from more than 30 percent of this base.



SOURCE: NLS data base (1/3/79:26).
NOTE: Excludes cases whose parenthood status is unknown as well as those of unknown gender. Data are preliminary and subject to revision.

Fig. 2--Timing of marriage in relation to end of high school for parents and nonparents who are ever married as of third follow-up

and 20-24 years old who have ever been married.* These proportions agree closely with those shown in Table 12 for the total NLS sample: (1) At ages 18-19 (which approximates our NLS respondents at the first follow-up), 24.2 percent of females and 9.6 percent of males were ever married in 1973 (vs. 24.2 percent and 11.1 percent, respectively, of NLS respondents at about age 19). (2) At ages 20-24 (which approximates our NLS respondents at the third follow-up), 57.4 percent of females and 37.9 percent of males were ever married in 1976 (vs. 54.2 percent and 38.8 percent, respectively, of NLS respondents at about age 22).

Data on the timing of marriage (Fig. 2) are scaled with reference to June 1972, the end of high school. Not surprisingly, the mean date of marriage varies systematically across the parenthood groups: The average late-adolescent mother married only 2 months after high school; women who commenced motherhood as adults married later; nonparents married the latest of all.

We have explored two other questions with simple tabular data: (1) Is marital disruption more frequent among parents than nonparents? (2) How rapidly do late-adolescent parents enlarge their families thereafter?

The first question is addressed in Fig. 3, which compares the percentage of initially married late-adolescent parents and nonparents whose marriages had been disrupted as of the third follow-up. Among males, parents were noticeably more prone to disruption than were nonparents. Among females, the same pattern prevails although it is more muted. The parent-nonparent difference here may be indicative of a genuine difference in the risk of disruption, consistent with other evidence that the accelerated adoption of adult roles generates stress in the family system.** Alternatively, the difference may be only an artifact of the somewhat longer duration of marriage (hence exposure

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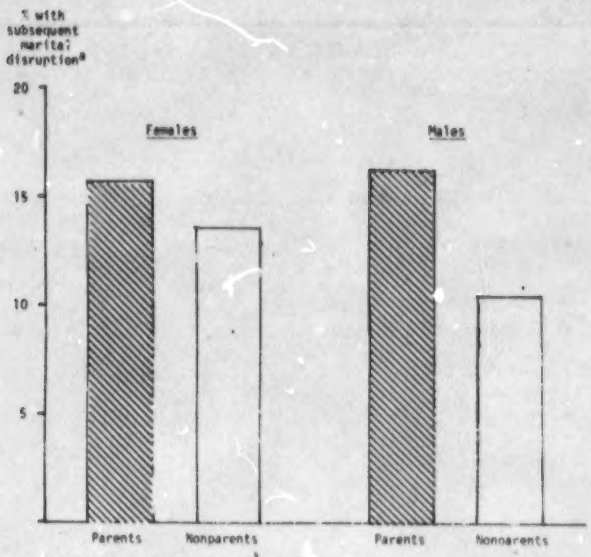
*Source: U.S. Bureau of the Census, *Current Population Reports*, Series P-20, Nos. 255 and 306, Table 1.

**Bacon, for example, reports a higher incidence of family dissolution the earlier the age of motherhood. See Lloyd Bacon, "Early Motherhood, Accelerated Role Transition, and Social Pathologies," *Social Forces*, Vol. 52, March 1974, pp. 333-341.



SOURCE: NLS data base (1/3/79:20-21).
NOTE: Excludes cases whose parenthood status is unknown as well as those of unknown gender. Data are preliminary and subject to revision.

[a]Disruption defined as divorced, separated, or widowed. Basis of percentage excludes respondents whose marital status at third follow-up is missing. Persons whose third follow-up marital status is "ever married, current status unknown" (ranging from 5 to 9 percent) are not counted as disrupted. Therefore, the true percentages with marital disruption probably are understated here, although not differentially by parenthood status.

Fig. 3--Subsequent marital disruption among late-adolescent parents and nonparents who were currently married at first follow-up (10/73)

Table 13

SUBSEQUENT FAMILY GROWTH AFTER LATE ADOLESCENCE: NONMOTHERS AND MOTHERS WITH ONE CHILD[a]

(percentages)

No. of children at third follow-up	Parenthood status at first follow-up	
	Nonmothers	Mothers with one child
0	41.5	--
1	40.5	50.7
2	9.1	36.8
≥ 3	0.7	5.5
Unknown	8.2	7.0
Total	100%	100%

SOURCE: NLS data base (12/21/78: 26-28).
NOTE: Excludes females whose parenthood status is unknown and persons of unknown gender.

[a]Restricted to females who were ever married as of first follow-up.

to the risk of disruption) among parents, as shown in Fig. 2. Further analysis aimed at clarifying this pattern is under way.

Table 13 compares the subsequent family growth of late-adolescent nonmothers and those mothers with exactly one child. (It is restricted to females who were ever married as of the first follow-up.) By the third follow-up, a substantial fraction of the mothers have advanced to two-child or larger families. The nonmothers are about evenly divided between childless and one-child families, with only a small percentage having more than one child. These data are consistent with the well-established association between early childbearing and a faster pace of subsequent childbearing.* Clearly, those women who became parents in late adolescence were considerably ahead of the other women in family building by the third-follow-up.

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*Larry L. Bumpass, et al., "Age and Marital Status at First Birth and the Pace of Subsequent Fertility," *Demography*, Vol. 15, No. 1, February 1978, pp. 75-86; James Trussell and Jane Menken, "Early Childbearing and Subsequent Fertility," *Family Planning Perspectives*, Vol. 10, No. 4, July/August 1978, pp. 209-218.

IV. ASSESSING THE CONSEQUENCES OF PARENTHOOD: A METHODOLOGY AND ITS APPLICATION

The procedure that we have devised for gauging marital and parenthood effects is a variant of analysis of covariance that sidesteps some of the main shortcomings of that procedure and takes advantage of the fact that the "control group" of single nonparents is much larger than the other groups--the married parents and the married nonparents.

DESCRIPTION OF THE METHOD

The conceptual basis of our method for estimating the marital and parenthood effects can be understood with reference to the schematic representation in Fig. 4. Briefly, the technique is based on the premise that the parenthood effect for a particular individual can be estimated by taking the difference between the individual's outcome measure y and the value of that measure that one would predict for a single nonparent having the same characteristics. The remainder of this section provides a theoretical development of this procedure that some readers may choose to skip.

Consider one of the outcome measures, say, the educational expectations of females in the NLS in 1973. Let the outcome measures for the women in the three groups be denoted as follows:

Single nonparents: $y_{11}, y_{12}, \ldots, y_{1n_1}$

Married nonparents: $y_{21}, y_{22}, \ldots, y_{2n_2}$

Married parents: $y_{31}, y_{32}, \ldots, y_{3n_3}$

Associated with each of the observations y_{ij} is a vector of p characteristics of that individual, say $x_{ij} = (x_{ij1}, \ldots, x_{ijp})'$, where the components of x_{ij} are the values of p characteristics such as measures of academic performance and socioeconomic status.

A typical analysis of covariance formulation for analyzing this data would begin with the assumption that the measures y_{ij} of

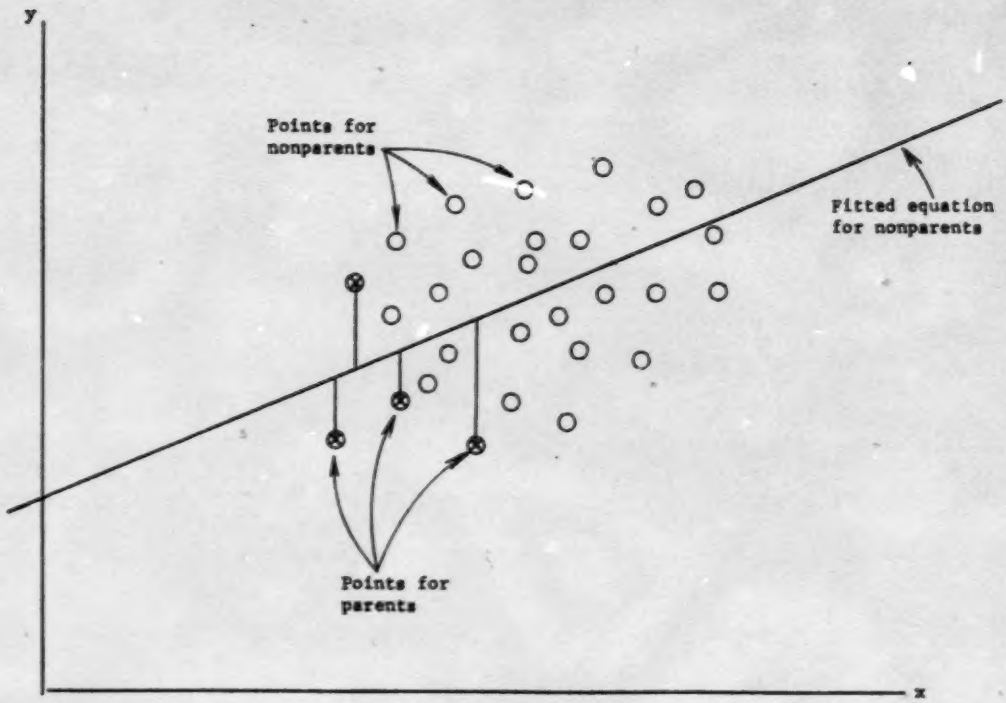

Fig. 4--Schematic representation of procedure for estimating individual parenthood effects

educational expectations consist of two parts: a "true response" μ_{ij} and an error of measurement e_{ij}, so that

$$y_{ij} = \mu_{ij} + e_{ij} , \qquad i = 1, 2, 3; \quad j = 1, 2, \ldots, n_i .$$

The key assumption in analysis of covariance is that the true responses μ_{ij} for the three groups are unknown linear functions of the coordinates of x_{ij} that differ only by additive constants measuring the "effects" of marriage and parenthood. One way of formulating this model is through the assumption that

$$(1) \qquad y_{ij} = \mu + \alpha_i + \beta' x_{ij} + e_{ij}$$

where $\alpha_1 = 0$, and μ, α_2, α_3, and the coordinates of the vector $\beta = (\beta_1, \beta_2, \ldots, \beta_p)'$ are parameters to be estimated from the data. In this formulation, α_2 and α_3 are called the "effects" of marriage and parenthood after controlling for differences in the x_{ij}'s. Typically, the error terms e_{ij} are assumed to be independent random variables with mean zero and unknown variance σ^2.

The main shortcomings of this approach are the implicit assumptions that (a) marriage and parenthood have the same constant effect on all individuals, and (b) the regression coefficients of y_{ij} upon x_{ij} are the same in all three groups. Anticipating that the consequences of marriage and parenthood will vary considerably from individual to individual, we reject the first assumption a priori, and we have plenty of empirical evidence to reject the second.

Our methodology retains the assumption that the observations in the control group can be fitted satisfactorily by a linear model with an appropriate choice of the x_{ij}'s. That is, we assume that the mean responses for the single nonparents satisfy

$$(2) \qquad \mu_{1j} = f(x_{1j}) = \beta_0 + \beta' x_{1j} ,$$

where the regression coefficients β_k specifying the linear function $f(x_{1j})$ can be estimated from the very large sample of single nonparents in the NLS.

Let us assume, for the moment, that we know the coefficients β_k that specify the equation (2) for the control group. Then it is natural to define the individual effect of marriage or parenthood for a person with vector of characteristics x_{ij} to be the deviation of the individual's true response μ_{ij} from the expected value of the response for a single nonparent having exactly the same characteristics. Accordingly, we define the "effect of parenthood" to be the difference between μ_{3j} and the value $f(x_{3j})$ that one would calculate for a single nonparent having identical characteristics. Denoting this effect by α_{3j}, we have that

$$\alpha_{3j} = \mu_{3j} - f(x_{3j}) .$$

Similarly, we let α_{2j} denote the corresponding "marriage effect" defined by

$$\alpha_{2j} = \mu_{2j} - f(x_{2j}) .$$

With these definitions, our model can be written in the form

$$y_{ij} = \beta_0 + \alpha_{ij} + \beta' x_{ij} + e_{ij} , \tag{3}$$

where $\alpha_{1j} = 0$ for $j = 1, 2, \ldots, n_1$.

This model makes no assumptions whatsoever about the pattern of the marriage and parenthood effects. However, for some purposes, we shall want to add the further assumption that the effects α_{ij} are also linear functions of the coordinates of x_{ij}, in which case the model can be reparameterized in the form

$$
\begin{aligned}
y_{1j} &= \beta_0 + \beta' x_{1j} + e_{1j}, \quad j = 1, 2, \ldots, n_1 , \\
y_{2j} &= \gamma_0 + \gamma' x_{2j} + e_{2j}, \quad j = 1, 2, \ldots, n_2 , \\
y_{3j} &= \delta_0 + \delta' x_{3j} + e_{3j}, \quad j = 1, 2, \ldots, n_3 .
\end{aligned} \tag{4}
$$

Under these assumptions, the model is like analysis of covariance except that no assumption is made about the equality of the vectors of regression coefficients β, γ, and δ across the groups.

For the purposes of this progress report, we shall restrict our attention to the "average effects" of marriage and parenthood. These parameters, denoted by α_2 and α_3 below, are defined as the average of the individual effects α_{ij} over all individuals in the same group, i.e.,

$$\alpha_i = \sum_{j=1}^{n_i} \alpha_{ij}/n_i , \qquad i = 2,3.$$

Under model (3) above and the assumptions that the errors e_{ij} are independent random variables with mean zero and the same variance, the best linear unbiased estimators (BLUEs) of the parameters α_{ij} and β_k, $k = 0, 1, \ldots, p$ are the least-squares estimators, i.e., the values that minimize

$$\sum_{i=1}^{3} \sum_{j=1}^{n_i} (y_{ij} - \beta_0 - \alpha_{ij} - \beta' x_{ij})^2 .$$

(Here, we are implicitly assuming that there are no missing values, a ubiquitous problem throughout this study that will be discussed below.) It follows that the least-squares estimators can be obtained from <u>complete</u> data using the following three-stage procedure:

(a) Estimate the parameters β_k using the least-squares estimators $\hat{\beta}_k$ based upon the observations for the <u>single nonparents</u> only.

(b) Predict the responses y_{ij} for the married nonparents and the married parents <u>ignoring the marriage and parenthood effects</u> using

(5) $$\tilde{y}_{ij} = \hat{\beta}_0 + \hat{\beta}' x_{ij} , \qquad j = 1, 2, \ldots, n_i .$$

(c) Estimate the individual effects using

$$\hat{\alpha}_{ij} = y_{ij} - \tilde{y}_{ij} .$$

It follows from standard linear model theory that the BLUEs of the average marriage and parenthood effects are

(6) $$\hat{\alpha}_i = \sum_{j=1}^{n_i} \hat{\alpha}_{ij} / n_i .$$

Given the pervasive missing-values problem, it is not feasible to evaluate these estimators using the three-stage procedure outlined above. Instead, simpler formulas analogous to those used in analysis of covariance have been derived.

Let $\bar{y}_i$ denote the mean of the outcome measures in the ith group and let $\bar{x}_i$ denote the corresponding mean vectors of the x_{ij}'s. Then it can be shown that (6) can be evaluated using the formula

(7) $$\hat{\alpha}_i = (\bar{y}_i - \bar{y}_1) - \hat{\beta}'(\bar{x}_i - \bar{x}_1) , \qquad i = 2,3.$$

This is the formula that is actually used in the calculations, where the means and regression coefficients are estimated from the incomplete data.

It is interesting to compare the estimators in (7) with the estimators derived under alternative assumptions. The corresponding analysis of covariance formula is like (7) except that the vector of regression coefficients $\hat{\beta}$ for the control group is replaced by the pooled estimator of β across the three groups. In cases like ours, where the mean vectors $\bar{x}_i$ differ considerably (see Table 14) and the within groups regression coefficients also differ, the analysis of covariance formula can lead to considerable bias in estimating the average marriage and parenthood effects.

Instead of assuming that the individual marriage and parenthood effects are completely unstructured as in (3), one may want to make the assumptions implicit in (4). In this case, it can be shown that

Table 14

MEANS OF SELECTED CHARACTERISTICS BY MARITAL AND PARENTHOOD STATUS, 1973

Characteristic	Females			Males		
	Nonparents		Married Parents[a]	Nonparents		Married Parents[a]
	Single	Married		Single	Married	
Academic ability	206.1	194.1	188.5	205.0	188.2	181.3
Rank in graduating class	61.6	56.0	49.7	49.2	39.4	35.8
SES index	-0.01	-0.28	-0.45	0.03	-0.27	-0.40
Race (%)						
White	76.7	82.0	70.7	80.3	81.0	66.9
Black	14.6	8.8	20.8	11.0	8.6	18.0
Other minority	8.7	9.2	8.5	8.7	10.4	15.1
High school program (%)						
Academic	44.8	20.5	18.4	46.6	21.8	19.7
Vocational education	23.9	39.3	37.2	18.3	29.0	31.2
General	31.3	40.2	44.4	35.1	49.2	49.1

NOTE: Data are preliminary and subject to revision.

[a]Late-adolescent parents only.

Table 15

ESTIMATES OF MARITAL AND PARENTHOOD EFFECTS ON EXPECTED YEARS OF EDUCATION[a]

Parenthood Status	Mean	Difference from Single Nonparents	Adjusted Difference[b]		t-statistics	
			Meth 1	Meth 2	Meth 1	Meth 2
Females						
Single nonparents	14.69					
Married nonparents	13.04	-1.65	-0.80	-0.41	-16.38	-9.53
Married parents[c]	12.90	-1.79	-0.84	-0.32	-11.01	-4.81
Males						
Single nonparents	15.06					
Married nonparents	13.56	-1.50	-0.59	-0.32	-7.60	-4.70
Married parents[c]	13.45	-1.60	-0.55	-0.14	-4.72	-1.35

NOTE: Data are preliminary and subject to revision.

[a]Expected years of education as of first follow-up. Based on response to NLS item FQ14: "As things stand now, how far in school do you think you actually WILL get?"

[b]Method 1 controls for differences in outcome measures due to differences among groups in academic ability, rank in high school graduating class, race, socioeconomic status, and high school program. Method 2 also adjusts for differences in the matching control variable measured in 1972.

[c]Late-adolescent parents only.

the BLUEs of the average marriage and parenthood effects are exactly the same as in (7). However, the standard errors of these estimates as well as test statistics for linear hypotheses will be different under the two models.

PRELIMINARY APPLICATIONS

We have so far restricted our attention to the consequences of late-adolescent parenthood and to a limited number of characteristics x_{ij} in analyzing outcome measures. (These limitations are simply ones of convenience at this stage.) The characteristics used, and their means, are shown in Table 14.

For each outcome measure (e.g., educational expectations as of the first follow-up), there is a matching control measure calculated from the base-year questionnaire (e.g., the student's educational expectations while in high school). Since we are undecided at this stage whether the matching control measure should be used as one of the independent variables in the analysis, we have carried out two sets of calculations, one in which the matching measure is excluded (Method 1) and one in which it is included (Method 2).

The calculations are summarized in Tables 15 to 17. The entries under the heading "adjusted differences" are the preliminary estimates of the marriage and parenthood effects under the two methods. The t-statistics are for testing the hypotheses that the average marriage and parenthood effects are zero. These t-statistics are the ones that are appropriate under the linear model specified in (3).

For the most part, these tables show that the late-adolescent parents do not differ greatly from their nonparent counterparts on these outcome measures, *after* controlling for differences in the characteristics of the individuals in the groups. Further calculations, using the married nonparents as the control group instead of the single nonparents, indicate only small differences (usually not statistically significant) between the two groups. This suggests that the effects of adolescent parenthood and adolescent marriage may be difficult to distinguish.

Table 16

ESTIMATES OF MARITAL AND PARENTHOOD EFFECTS ON SELF-ESTEEM[a]

Parenthood Status	Mean	Difference from Single Nonparents	Adjusted Difference[b]		t-statistics	
			Meth 1	Meth 2	Meth 1	Meth 2
Females						
Single nonparents	1.898					
Married nonparents	1.887	-0.011	-0.058	-0.050	-3.61	-3.44
Married parents[c]	1.906	0.009	-0.042	-0.004	-1.69	-0.15
Males						
Single nonparents	1.856					
Married nonparents	1.806	-0.049	-0.078	-0.074	-3.51	-3.60
Married parents[c]	1.849	-0.007	-0.038	-0.031	-1.15	-1.02

NOTE: Data are preliminary and subject to revision.

[a]Self-esteem as of first follow-up. Based on mean of responses to NLS items FQ15a, 15c, 15d, and 15h.

[b]Method 1 controls for differences in outcome measures due to differences among groups in academic ability, rank in high school graduating class, race, socioeconomic status, and high school program. Method 2 also adjusts for differences in the matching control variable measured in 1972.

[c]Late-adolescent parents only.

Table 17

ESTIMATES OF MARITAL AND PARENTHOOD EFFECTS ON LOCUS OF CONTROL[a]

Parenthood Status	Mean	Difference from Single Nonparents	Adjusted Difference[b]		t-statistics	
			Meth 1	Meth 2	Meth 1	Meth 2
Females						
Single nonparents	3.883					
Married nonparents	3.880	-0.002	0.077	0.057	4.45	3.50
Married parents[c]	3.719	-0.163	-0.010	-0.007	-0.38	-0.26
Males						
Single nonparents	3.803					
Married nonparents	3.757	-0.046	0.066	0.055	2.59	2.29
Married parents[c]	3.618	-0.184	-0.012	0.010	-0.32	0.28

NOTE: Data are preliminary and subject to revision

[a]Locus of control as of first follow-up. Based on mean of responses to NLS items FQ15b, 15e, 15f, and 15g.

[b]Method 1 controls for differences in outcome measures due to differences among groups in academic ability, rank in high school graduating class, race, socioeconomic status, and high school program. Method 2 also adjusts for differences in the matching control variable measured in 1972.

[c]Late-adolescent parents only.

To illustrate how these data are interpreted, consider the outcome "Expected years of education" (Table 15). On average, respondents who were married in late 1973 expected to achieve between 1.5 and 1.8 fewer years of education than the single respondents of the same sex. After allowing for differences in academic ability, class rank, race, socioeconomic status, and high school program, the differences across groups in expected educational attainment shrink to about 0.8 years for females (0.84 for parents, 0.80 for nonparents) and 0.6 years for males (0.55 for parents, 0.59 for nonparents). If one also controls for differences in the student's educational expectations while still in high school, the differences shrink further to 0.41 (0.32) years for the female nonparents (parents) and to 0.32 (0.14) years for the male nonparents (parents).

Since some of the married parents in our sample were already married or expecting children before they left high school, it is questionable whether the student's educational expectations while still in high school can be used as a control variable in estimating the effects of parenthood. Given the sensitivity of our preliminary estimates to the inclusion of this variable as a control variable, the reader should regard the preliminary estimates above with some skepticism. Moreover, these estimates were calculated before the marital and parenthood status variables described in Sec. II were created, thereby enabling us to pinpoint the timing of marriage and first parenthood more precisely. Using these newly created variables, we are currently investigating the extent to which the student's high school characteristics and attitudes may already have been affected by changes in marital and parenthood status. Until that analysis is completed, our preliminary estimates above are, at best, suggestive.

V. SUMMARY AND CONCLUSIONS

Although the NLS has serious defects as a source of information on adolescent parenthood, it also has substantial advantages over other data sets. Among these are:

- *Large sample size:* The NLS contains 1248 late-adolescent parents, and comparison groups of nonparents that number at least 15,000.
- *Timeliness:* Adolescent parenthood referred to on the NLS occurred in the early 1970s, not in some indefinite earlier period, as is the case with data sets that are retrospective in nature.
- *Availability of comparison groups:* It is possible not only to compare parents with nonparents but also to compare younger parents with older parents.

In this exploratory paper, we have described the major defects encountered so far and the remedies we have devised. In applying these remedies, we have monitored our results closely to detect signs of possible bias and to determine their comparability with independent sources of information. The resulting parent groups (late-adolescent, early-adult, and adult parents) appear representative in terms of their racial and socioeconomic composition and trends in family size. For the entire sample, the proportion who have ever been married is in close agreement with comparable data from a reliable independent source. These various benchmark comparisons strengthen our confidence in the basic soundness of our procedures for estimating respondents' parenthood and marital status.

We have presented a statistical model for gauging the consequences of parenthood. This model enables us to take maximum advantage of the large "control group" of single nonparents that exists in defining and estimating marital and parenthood effects. The model is based on the premise that the parenthood effect for a particular individual can be estimated by taking the difference between the individual's outcome

measure and the value of that measure one would predict for a single nonparent having the same characteristics. Preliminary applications illustrate the difficulty in distinguishing the effects of adolescent parenthood from those of adolescent marriage.